

APPENDIX R
Confined Disposal Facility Human Health Evaluation



Screening-Level Human Health Evaluation of for Confined Disposal Placement of IHNC Dredged Materials

The objective of this preliminary evaluation was to address concerns regarding the potential for human health impacts associated with exposure to IHNC dredged material disposed in the proposed confined disposal facility (CDF) adjacent to the MRGO. The proposed CDF area is presently undeveloped for human use and is to remain as such following the confined disposal of IHNC dredged material unsuitable for open-water discharge. Therefore, the land use is neither intended as industrial, commercial or non-industrial (residential) and opportunities for human exposure are expected to be limited to authorized personnel working in the disposal operation or maintaining the site, and the occasional authorized and non-authorized visitor to the site. Surrounding land uses include a salvage yard to the west and undeveloped land to the east.

As a screening level evaluation, concentrations of contaminants measured in dredged material proposed for placement in the CDF were compared to LDEQ-derived Screening Standards (SS) for soil for non-industrial (residential) and industrial/commercial land use scenarios (LDEQ 2003). The exposure pathways addressed by the SS include the ingestion of soil, the inhalation of volatile emissions released from soil to the ambient air, and dermal contact with soil. This comparison does not take into account any engineering controls that might be employed at the site to minimize exposure in human, wildlife, or aquatic receptors, such as capping or restricted access, and is therefore considered to be a conservative analysis. In addition, safety precautions may be implemented for the protection of workers at the site to prevent soil ingestion, inhalation and dermal contact.

The maximum concentration detected for each constituent in sediment was compared to the limiting SS. If the maximum constituent concentration(s) detected at the area of concern is less than or equal to the limiting SS, then it is typically interpreted that the soil does not pose a threat to human health and that it does not warrant further evaluation or action. If the maximum constituent concentration(s) detected in soil exceeds the SS, further evaluation may be warranted to assess potential exposure and determine the need for engineering controls or management actions at the site.

Table 1 provides a comparison of the maximum concentration of dredged material proposed for CDF disposal (Table 4-3 of the SEIS) with the Screening Standards for soils (LDEQ 2003). Out of the constituents with Screening Standards, only 20 were not measured in IHNC dredged material. For the remaining constituents, only one exceeded the Screening Standards for industrial land use scenario (SSi). When compared to the more strict non-industrial (i.e., residential) Screening Standards (SSni), only five constituents exceed the Screening Standards. Exceedances were observed only for dredged material proposed for placement in the permanent disposal cell of the CDF (DMMUs 1, 2, 5 and 7) according to disposal alternative presented in Appendix C. Concentrations in material proposed for temporary stockpile in the CDF and later used as backfill at the construction site (DMMU 6) do not exceed SSi or SSni.

Comparison to LDEQ Industrial Screening Standards for Soils

Table 2 summarizes the contaminants of concern with maximum concentrations exceeding industrial screening standards for soils (SSi). Only the PAH benzo(a)pyrene was detected at a concentration exceeding the SSi in DMMUs 5 and 7. The highest concentration of benzo(a)pyrene (DMMU 7) exceeds the SSi for that compound by a factor of only 2.2. Loss of the compound during placement and consolidation via volatilization degradation is expected. Those losses are likely to bring the concentration in the consolidated and dried material in the CDF to a concentration benzo(a)pyrene that will be lower than the SSi. Two constituents, chloroform and trichloroethene, were reported as non-detect but with a reporting limit exceeding the SSi in one DMMU (DMMU 2). Because the reporting limit for these two constituents was less than the SSi for all other DMMUs (< 0.012 mg/kg compared to SSi of 0.30 mg/kg and 0.21 mg/kg, respectively), and all other samples were reported as non-detect, the aggregate concentration of chloroform and trichloroethene in the CDF following placement is expected to be lower than the SSi.

Because the CDF will not have any use other than storage of dredged material, comparison to SS for industrial land use scenario provides a conservative evaluation for potential human health risks. Site workers and trespassers may have an opportunity to come into contact with benzo(a)pyrene in the dredged material placed in the CDF, mainly via dermal contact with the dredged material or inhalation of particles of consolidated and dried material. Based on these short-term exposures no health effects are expected to occur in workers or trespassers from the expected minimal exposure. However, the need for implementation of exposure precautions will be evaluated prior to any excavation or handling of dredged material within the CDF.

Comparison to LDEQ Non-Industrial Screening Standards for Soils

Table 3 summarizes the constituents with concentration in one or more DMMU exceeding non-industrial screening standards for soils (SSni). In addition to benzo(a)pyrene, two PAHs (benzo(a)anthracene and benzo(b)fluoranthene), PCBs (as total Aroclors), and barium were detected in some, but not all, dredged material composite samples for DMMUs proposed for disposal at the CDF (DMMUs 1, 2, 5, and 7) at concentrations exceeding the SSni. In addition, one chlorinated pesticide (toxaphene) and five volatile constituents were reported as non-detects with the reporting limit exceeding the SSni for DMMU 2 but not for the other DMMUs. Because the reporting limit for these two constituents was less than the SSi for all other DMMUs, and all samples were reported as non-detect, the actual aggregate concentration of those constituents in the CDF following placement is expected to be far lower than the SSi. The highest concentration of PCBs (as total Aroclors) (DMMU 7) exceeds the SSni for PCBs by a factor of 7.0 and the highest concentration of barium exceeds the SSni for that metal by a factor of 2.6. For PAHs, the factor of maximum concentrations (DMMU 7) exceeds the SSni for those compounds by a factor of only 1.1 - 2.2.

Volume-weighted averages calculated for DMMUs 1, 2, 5 and 7 for constituents with concentration in one or more DMMU exceeding SSni are presented in Table 4. That average concentration of total Aroclor exceed the SSni for PCBs by a factor of 4.6 and the average concentration of barium exceeds the SSni by a factor of 1.3. For PAHs, the range is lowered to

0.8 to 1.7. When the comparison is made to Management Option 1 Standards for Soil (SOILni), the volume-weighted average is only one tenth of the corresponding SSni for barium and only a factor of 2.4 higher than the SSni for PCBs.

According to the dredging and disposal plan proposed in Appendix C (Table 7.1), material dredged will be dredged and placed in the CDF in year 1 for DMMU 7, years 2 and 3 for DMMU 5 and years 6 and 7 for DMMUs 1 and 2. Therefore, material from DMMUs 1 and 2 will overlay materials from DMMUs 5 and 7 at the conclusion of the disposal operation in the CDF. Volume-weighted averages calculated for DMMUs 1 and 2 calculated for constituents with concentration in one or more DMMU exceeding SSni are presented in Table 5. The average concentrations of total Aroclor and barium exceed the SSni for PCBs and barium by a factor of 1.6. For PAHs, no exceedance is observed. When the comparison is made to Management Option 1 Standards for Soil (SOILni), the volume-weighted average is only two tenths of the corresponding SSni for barium and only nine tenths of SSni for PCBs. Therefore, the soil concentrations in the CDF following placement and consolidation of the dredged material are expected to be lower than the SSni for all constituents listed in Table 1.

The CDF will be designed to fully contain IHNC dredged material. Therefore, human exposure to material stored in the CDF is only expected to occur within the perimeter of the facility. Because the CDF will not have any use other than storage of dredged material, comparison to RECAP Screening Standards for residential land use scenario provides an overly conservative evaluation for potential human health risks. Trespassers may have infrequent contact with the dredged material placed in the CDF. No health effects are expected to occur in trespassers from the expected minimal exposure via particle inhalation or dermal contact with the dredged material. Migration of material from the CDF via dust transport into residential neighborhoods is expected to be negligible during the consolidation period and substantially less after the area becomes vegetated following placement of all dredged material proposed for confined disposal. Migration of material from the CDF in the unlikely event of a catastrophic breach of the retention dikes would result in orders of magnitude dilution of the dredged material stored in the CDF before it would be transported to neighboring areas.

Summary and Conclusions

The objective of this preliminary evaluation was to address concerns regarding the potential for risks to human health associated with exposure to IHNC dredged material disposed in the proposed confined disposal facility (CDF) adjacent to the MRGO. As a screening level evaluation, concentrations of contaminants measured in dredged material proposed for placement in the CDF were compared to LDEQ-derived Screening Standards (SS) for soil for non-industrial (residential) and industrial/commercial land use scenarios (LDEQ 2003). Exceedances were observed only for dredged material proposed for placement in the permanent disposal cell of the CDF (DMMUs 1, 2, 5 and 7) according to disposal alternatives presented in Appendix C. Concentrations in material proposed for temporary stockpile in the CDF and later used as backfill at the construction site (DMMU 6) do not exceed SSi or SSni. Only one constituent in dredged material proposed for placement in the permanent disposal cell of the CDF exceeded the Screening Standards for industrial land use scenario (SSi). When compared to the more strict non-industrial (i.e., residential) Screening Standards (SSni), only five constituents exceed the Screening Standards. Out of the five constituents that exceeded SS standards, only two also exceeded Management Option 1 standards for non-industrial use scenarios, and these exceedances were small.

This analysis is very conservative (i.e. human health protective) for the following reasons:

- Screening values developed by LDEQ are very conservative;
- For the sake of comparison, we assumed industrial or commercial site use. In fact, the proposed CDF area is presently undeveloped for human use and is to remain as such following the confined disposal of IHNC dredged material unsuitable for open-water discharge. Therefore, the land use is neither intended as industrial, commercial or non-industrial (residential) and opportunities for human exposure are expected to be limited to authorized personnel working in the disposal operation or maintaining the site, and the occasional authorized and non-authorized visitor to the site.
- Our analysis does not take into account any engineering controls (e.g., capping) that might be employed at the site to minimize potential exposure to humans, wildlife, or aquatic receptors, such as capping or restricted access following a detailed analysis of terrestrial exposure pathways and risks.
- Degradation of organic compounds in the dredged materials proposed for placement in the CDF is not considered.

Based on this analysis, we conclude that risk associated with material placement in the proposed CDF is minor.

Table 1. Comparison of Maximum Measured Concentration in IHNC Dredged Material Proposed for CDF Disposal (DMMUs 1, 2, 5, and 7) to LDEQ RECAP Soil Screening Standards.

Constituent Name	Maximum DM (mg/kg) ¹	LDEQ SOIL SSni ² (mg/kg)	LDEQ SOIL SSi ³ (mg/kg)
Acenaphthene	0.27	370	6100
Acenaphthylene	0.24	350	5100
Acetone	0.35	170	1400
Aldrin	0.04	0.03	0.13
Aniline	ND	2.4	17
Anthracene	0.64	2200	48000
Antimony	0.4	3.1	82
Arsenic	9.4	12	12
Barium	1410	550	14000
Benzene	BRL (0.55) ⁴	1.5	3.1
Benzo(a)anthracene	0.7	0.6	2.9
Benzo(a)pyrene	0.7	0.3	0.3
Benzo(b)fluoranthene	1	0.6	2.9
Benzo(k)fluoranthene	0.36	6.2	29
Beryllium	0.87	16	410
Biphenyl, 1,1-	ND		
Bis(2-Chloroethyl) ether	BRL (0.05)	0.3	1.1
Bis(2-chloroisopropyl)ether	BRL (0.05)	4.9	17
Bis(2-Ethylhexyl) phthalate	0.88	35	170
Bromodichloromethane	BRL (0.56)	1.8	4.2
Bromoform	BRL (0.55)	48	180
Bromomethane	BRL (0.55)	0.43	3
Butyl benzyl phthalate	0.18	220	220
Cadmium	0.85	3.9	100
Carbon disulfide	BRL (0.55)	36	250
Carbon tetrachloride	BRL (0.55)	0.18	1.1
Chlordane (technical)	0.36	1.6	10
Chloroaniline	ND	16	170
Chlorobenzene	3.4	17	120
Chlorodibromomethane	BRL (0.55)	2.2	5.4
Chloroethane	BRL (0.55)	4.1	8.2
Chloroform	BRL (0.55)	0.04	0.3
Chloromethane	BRL (0.55)	3.5	7.3
Chloronaphthalene, 2-	BRL (0.04)	500	8300
Chlorophenol, 2-	0.2	15	140
Chromium(III)	29	12000	310000
Chromium (VI)	0.9	23	610
Chrysene	0.9	62	290

Table 1. Comparison of Maximum Measured Concentration in IHNC Dredged Material Proposed for CDF Disposal (DMMUs 1, 2, 5, and 7) to LDEQ RECAP Soil Screening Standards (Continuation).

Constituent Name	Maximum DM (mg/kg) ¹	LDEQ SOIL SSni ² (mg/kg)	LDEQ SOIL SSi ³ (mg/kg)
Cobalt	ND	470	12000
Copper	99	310	8200
Cyanide, Total	1.8	150	3600
DDD	0.04	2.4	16
DDE	0.02	1.7	11
DDT	0.04	1.7	12
Dibenz(a,h)anthracene	0.12	0.33	0.33
Dibenzofuran	0.19	29	150
Dibromo-3-chloropropane	ND	0.18	1.6
Dichlorobenzene, 1,2-	BRL (0.04)	99	380
Dichlorobenzene, 1,3-	BRL (0.04)	2.1	18
Dichlorobenzene, 1,4-	BRL (0.04)	6.7	16
Dichlorobenzidine, 3,3'-	BRL (0.19)	0.97	4.2
Dichloroethane, 1,1-	BRL (0.55)	66	470
Dichloroethane, 1,2-	BRL (0.55)	0.82	1.8
Dichloroethene, 1,1-	BRL (0.55)	13	91
Dichloroethene, 1,2- (total)	BRL (0.55)	4.8	34
Dichloroethene, trans-1,2-	BRL (0.55)	6.9	48
Dichlorophenol, 2,4-	BRL (0.55)	16	200
Dichloropropane, 1,2-	BRL (0.55)	0.69	1.8
Dichloropropene, cis-1,3-	BRL (0.55)	3.1	10
Dieldrin	0.04	0.03	0.15
Diethyl phthalate	0.003	670	670
Dimethylphenol	BRL (0.19)	93	1100
Dimethyl phthalate	BRL (0.05)	1500	1500
Di-n-octylphthalate	0.2	240	3500
Dinitrobenzene, 1,3-	ND	0.45	5
Dinitrophenol, 2,4-	BRL (0.98)	7.1	69
Dinitrotoluene, 2,6-	BRL (0.19)	4.3	46
Dinitrotoluene, 2,4-	BRL (0.19)	8.9	98
Dinoseb	BRL (0.1)	4.7	54
Endosulfan	BRL (0.04)	34	450
Endrin	0.04	1.8	25
Ethylbenzene	BRL (0.55)	160	230
Fluoranthene	2.3	220	2900
Fluorene	0.25	280	5400
Heptachlor	0.04	0.016	0.035
Heptachlor epoxide	0.04	0.053	0.26

Table 1. Comparison of Maximum Measured Concentration in IHNC Dredged Material Proposed for CDF Disposal (DMMUs 1, 2, 5, and 7) to LDEQ RECAP Soil Screening Standards (Continuation).

Constituent Name	Maximum DM (mg/kg)¹	LDEQ SOIL SSni² (mg/kg)	LDEQ SOIL SSi³ (mg/kg)
Hexachlorobenzene	BRL (0.04)	0.34	2
Hexachlorobutadiene	BRL (0.04)	0.82	8.6
Hexachlorocyclohexane, alpha	ND	0.082	0.44
Hexachlorocyclohexane, beta	ND	0.29	1.6
Hexachlorocyclohexane, gamma	ND	0.39	2
Hexachlorocyclopentadiene	BRL (0.19)	1.4	9.4
Hexachloroethane	BRL (0.04)	5.2	68
Indeno(1,2,3-cd)pyrene	0.44	0.62	2.9
Isobutyl alcohol	ND	730	6200
Isophorone	BRL (0.19)	340	1100
Lead (inorganic)	310	400	1400
Mercury (inorganic)	0.21	2.3	61
Methoxychlor	0.04	30	430
Methylene chloride	BRL (0.55)	19	44
Methyl ethyl ketone	BRL (0.55)	590	4400
Methyl isobutyl ketone	BRL (0.55)	450	3100
Methylnaphthalene, 2-	0.04	22	170
MTBE (methyl tert-butyl ether)	ND	650	4700
Naphthalene	0.03	6.2	43
Nickel	27	160	4100
Nitrate	ND	13000	330000
Nitrite	ND	780	20000
Nitroaniline,2-	ND	1.7	1.7
Nitroaniline,3-	ND	13	140
Nitroaniline,4-	ND	10	100
Nitrobenzene	BRL (0.04)	2.2	25
Nitrophenol, 4-	BRL (0.19)	0.33	0.33
Nitrosodi-n-propylamine, N-	BRL (0.19)	0.33	0.33
N-Nitrosodiphenylamine	BRL (0.04)	90	400
Pentachlorophenol	BRL (0.19)	2.8	9.7
Phenanthrene	0.9	2100	43000
Phenol	0.4	1300	15000
Polychlorinated biphenyls	0.77	0.11	0.9
Pyrene	1.7	230	5600
Selenium	2.3	39	1000
Silver	0.31	39	1000
Styrene	BRL (0.55)	500	1700
Tetrachlorobenzene,1,2,4,5-	ND	1.2	12
Tetrachloroethane,1,1,1,2-	ND	2.7	5.9

Table 1. Comparison of Maximum Measured Concentration in IHNC Dredged Material Proposed for CDF Disposal (DMMUs 1, 2, 5, and 7) to LDEQ RECAP Soil Screening Standards (Continuation).

Constituent Name	Maximum DM (mg/kg)¹	LDEQ SOIL SSni² (mg/kg)	LDEQ SOIL SSi³ (mg/kg)
Tetrachloroethane, 1,1,2,2-	BRL (0.55)	0.81	2
Tetrachloroethylene	BRL (0.55)	8.3	35
Tetrachlorophenol,2,3,4,6-	ND	140	1400
Thalium	0.25	0.55	14
Toluene	BRL (0.55)	68	470
Toxaphene	BRL (1.4)	0.44	2.2
Trichlorobenzene, 1,2,4-	BRL (0.19)	66	1200
Trichloroethane, 1,1,1-	BRL (0.55)	82	700
Trichloroethane, 1,1,2-	BRL (0.55)	1.9	4.3
Trichloroethene	BRL (0.55)	0.1	0.2
Trichlorofluoromethane	ND	38	260
Trichlorophenol,2,4,5-	ND	530	6600
Trichlorophenol, 2,4,6-	BRL (0.19)	40	170
Vanadium	ND	55	1400
Vinyl chloride	BRL (0.55)	0.24	0.79
Xylenes	BRL (1.6)	18	120
Zinc	414	2300	61000
TPH	5	65	510
¹ Concentrations or RL exceeding SSi values are in bold; ² LDEQ RECAP Soil Screening Standards for non-industrial land use (SSni); ³ LDEQ RECAP Soil Screening Standards for Industrial and Commercial Land Use (SSi); ⁴ For constituents with concentrations below the laboratory reporting limit (BRL), the highest reporting limit is given in parenthesis.			

Table 2. DM Concentrations Exceeding LDEQ RECAP Screening Standards for Industrial and Commercial Land Use (SSi).

Constituent Name	Screening Option SOIL_SSi	DMMU 1	DMMU 2	DMMU 5	DMMU 7	Max DMMU to SSi Ratio
In Situ Volume (cy)		48,100	88,700	78,500	314,600	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
PAH						
Benzo(a)pyrene	0.33	0.18	0.24	0.36	0.74	2.2
Volatiles						
Chloroform	0.30	0.012	BRL (0.55)	BRL (0.01)	BRL (0.01)	1.8
Trichloroethene	0.21	0.012	BRL (0.55)	BRL (0.01)	BRL (0.01)	2.6

Table 3. DM Concentrations Exceeding LDEQ RECAP for Non-Industrial Land Use Screening Standards (SSni) or Management Option 1 Standards for Soil (SOILni).

Constituent Name	Screening Option SOIL_SSni	Management Option 1 SOILni	DMMU 1	DMMU 2	DMMU 5	DMMU 7	Max DMMU to SSni Ratio
In Situ Volume (cy)			48,100	88,700	78,500	314,600	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Metals							
Barium	550	5500	1410	579	580	671	2.6
PCBs							
Aroclors (Total)	0.11	0.21	0.22	0.16	0.003	0.77	7.0
PAH							
Benzo(a)anthracene	0.62	0.62	0.17	0.26	0.39	0.69	1.1
Benzo(a)pyrene	0.33	0.33	0.18	0.24	0.36	0.74	2.2
Benzo(b)fluoranthene	0.62	0.62	0.25	0.27	0.47	1.00	1.6
Organochlorine Pesticide							
Toxaphene	0.4	0.4	BRL (0.2)	BRL (0.07)	BRL (0.13)	BRL (1.4)	3.5
Volatiles							
Bromomethane	0.43	4.3	0.012	BRL (0.55)	BRL (0.01)	BRL (0.01)	1.3
Carbon tetrachloride	0.18	0.53	0.012	BRL (0.55)	BRL (0.01)	BRL (0.01)	3.1
Chloroform	0.04	0.4	0.012	BRL (0.55)	BRL (0.01)	BRL (0.01)	13.8
Trichloroethene	0.1	0.1	0.012	BRL (0.55)	BRL (0.01)	BRL (0.01)	5.5
Vinyl chloride	0.24	0.24	0.012	BRL (0.55)	BRL (0.01)	BRL (0.01)	2.3

Table 4. Volume-weighted Mean Concentrations for DMMUs 1, 2, 5 and 7 compared to LDEQ RECAP for Non-Industrial Land Use Screening Standards (SSni) or Management Option 1 Standards for Soil (SOILni) for constituents summarized in Table 3.

Constituent Name	Screening Option SOIL_SSni	Management Option 1 SOILni	Volume-Weighted Average	VWA to SSni Ratio	VWM to MO1 SOILni Ratio
	(mg/kg)	(mg/kg)	(mg/kg)		
Metals					
Barium	550	5500	709	1.3	0.1
PCBs					
Aroclors (Total)	0.11	0.21	0.50	4.6	2.4
PAH					
Benzo(a)anthracene	0.62	0.62	0.53	0.8	0.8
Benzo(a)pyrene	0.33	0.33	0.55	1.7	1.7
Benzo(b)fluoranthene	0.62	0.62	0.73	1.2	1.2
Organochlorine Pesticide					
Toxaphene	0.4	0.4	BRL (0.9)	2.3	2.3
Volatiles					
Bromomethane	0.43	4.3	BRL (0.10)	0.2	0.02
Carbon tetrachloride	0.18	0.53	BRL (0.10)	0.6	0.2
Chloroform	0.04	0.4	BRL (0.10)	2.5	0.3
Trichloroethene	0.1	0.1	BRL (0.10)	1.0	1.0
Vinyl chloride	0.24	0.24	BRL (0.10)	0.4	0.4

Table 5. Volume-weighted Mean Concentrations for DMMUs 1 and 2 compared to LDEQ RECAP for Non-Industrial Land Use Screening Standards (SSni) or Management Option 1 Standards for Soil (SOILni) for constituents summarized in Table 3.

Constituent Name	Screening Option SOIL_SSni	Management Option 1 SOILni	Volume- Weighed Average	VWA to SSni Ratio	VWM to MO1 SOILni Ratio
	(mg/kg)	(mg/kg)	(mg/kg)		
Metals					
Barium	550	5500	871	1.6	0.2
PCBs					
Aroclors (Total)	0.11	0.21	0.18	1.6	0.9
PAH					
Benzo(a)anthracene	0.62	0.62	0.23	0.4	0.4
Benzo(a)pyrene	0.33	0.33	0.22	0.7	0.7
Benzo(b)fluoranthene	0.62	0.62	0.26	0.4	0.4
Organochlorine Pesticide					
Toxaphene	0.4	0.4	BRL (0.10)	0.3	0.3
Volatiles					
Bromomethane	0.43	4.3	BRL (0.36)	0.8	0.1
Carbon tetrachloride	0.18	0.53	BRL (0.36)	2.0	0.7
Chloroform	0.04	0.4	BRL (0.36)	9.0	0.9
Trichloroethene	0.1	0.1	BRL (0.36)	3.6	3.6
Vinyl chloride	0.24	0.24	BRL (0.36)	1.5	1.5